sound as clear as light

amt 1b
bookshelf

Heil air-motion transformer loudspeaker system

The feel of excellence.™

Audible excellence is desired of every component in a high fidelity system. But the finest electronics can sound only as good as the loudspeakers they are played through.

The newly refined and improved AMT 1b Bookshelf owes its excellence largely to the Heil air-motion transformer midrange-tweeter, the most revolutionary loudspeaker development of the past half-century.

Unexcelled system coherency and balance is made possible by technically advanced crossover circuitry and a newly improved low frequency system. Equal care in the construction of the handsome cabinet assures structural rigidity and acoustic superiority. The 1b Bookshelf is the finest bookshelf system ESS makes. Indeed, it is one of the finest in the world.

The Heil air-motion transformer midrange-tweeter. The remarkable Heil air-motion transformer is truly a monumental breakthrough in loudspeaker design, far superior to conventional cone drivers. The Heil's lightweight Teflon® diaphragm, equivalent in surface area to an *eight* inch midrange, is accordion-folded into a one-inch pleated band. The diaphragm squeezes air between its pleats at *five times* its own speed, resulting in extremely swift air acceleration.

A simple experiment dramatically illustrates the superiority of the squeezing motion. Imagine trying to "shot put" or *push* a light object like a cherry pit (representing air) with the palm of your hand (a speaker cone). It won't travel very far or fast (Fig. 1). Now put the pit between your thumb and forefinger and *squeeze* (Fig. 2). It squirts out at high velocity. The physics of the Heil are as simple and as brilliant as this illustration of the principle of leverage.

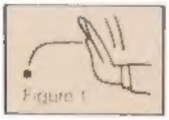


Figure 1

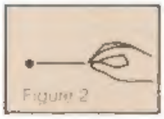


Figure 2

Each characteristic of the Heil contributes to an actual, audible superiority:

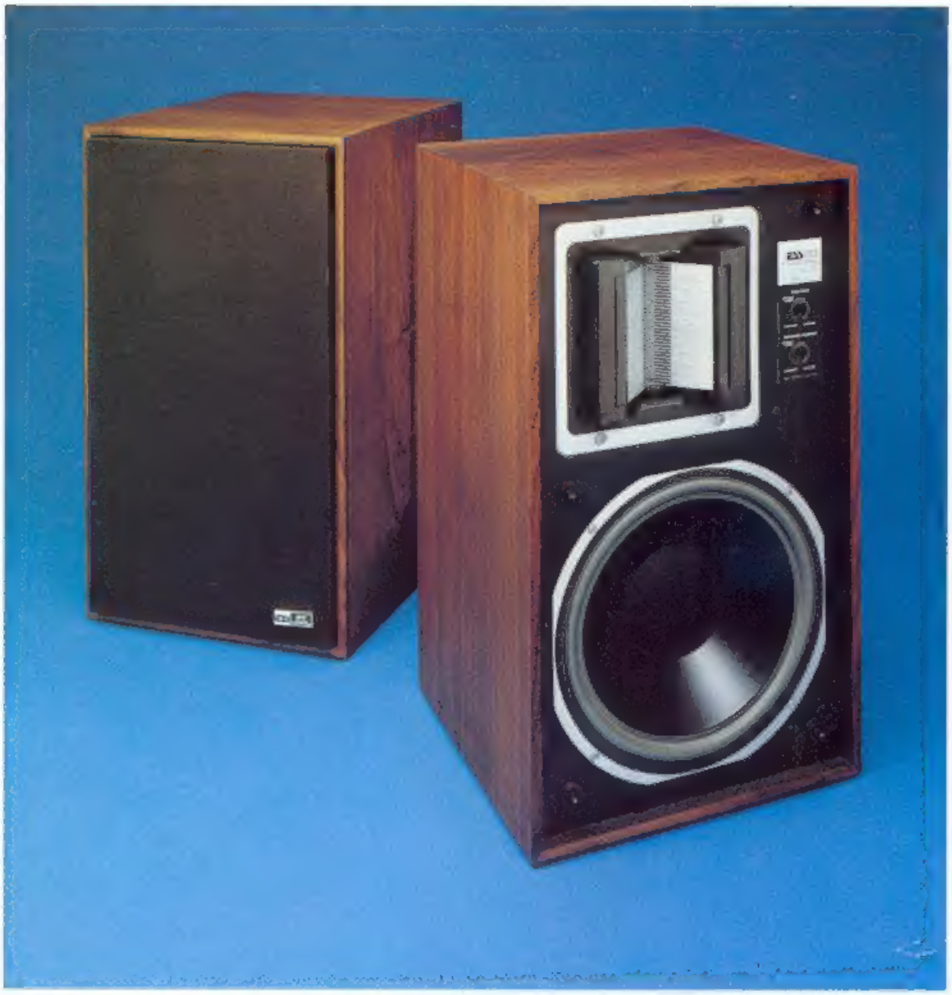
☐ Its large driving area results in reduced distortion and increased dynamic range.

☐ Folding this large area into a small point source results in superior dispersion and freedom from "boxiness."

☐ The low mass of the lightweight diaphragm yields high efficiency and "instant acceleration."™

☐ High transformation, low diaphragm velocity and instant acceleration™ all lead to greater dynamic range and superb transients.

☐ The accordion-like pleats provide



an evenly distributed drive. By preventing cone "break up," the pleats contribute to the Heil's great clarity and high definition.

The versatile 1b Bookshelf is the most compact system to incorporate the full-size Heil, the same one found in the incredible Transar/atd full-range Heil sound system by ESS. This newest version of the "Great" Heil offers a smoother, flatter response, owing to a new refinement in the folded "hinge" area of its diaphragm.

The superiority of the Heil air-motion transformer over conventional drivers is as dramatic as that of a jet aircraft over an old propeller plane. It is simply superior in too many ways and by too great a degree to be comparable.

The ESS Bextrene low frequency driver. Like the floor-standing 1b, the Bookshelf is equipped with an exceptionally rugged vacuum-formed Bextrene low frequency driver newly improved and built entirely by ESS. Developed by BBC studio engineers for studio reference systems, Bextrene is a polystyrene compound with exceptional properties not found in pulp cones:

- ☐ Low mass.
- ☐ High structural rigidity.
- ☐ Great internal molecular damping for superb quieting.
- ☐ Less susceptible to resonance and masking distortion.
- ☐ Greater clarity and accuracy.

Passive radiator. A rear-mounted 12 inch passive radiator operates in tandem with the Bextrene woofer to augment bass response. The passive radiator serves the same purpose as a port, but avoids the distortion added by a port or the loss of efficiency inherent in acoustic suspension systems.

Crossover circuitry and controls. Improved phase response, greater power handling capability and improved driver damping in the crossover region are all results of the 1b Bookshelf's completely new frequency dividing network. This sophisticated parallel type 1,000 Hz crossover assures proper matching of the woofer with the Heil by means of a steep 18 dB per octave slope.

The 1b Bookshelf now includes the same dual controls as the floor-standing system. They allow the listener to achieve precisely the midrange and high frequency performance desired.

Hand crafted cabinetry. The uncompromising performance of the AMT 1b Bookshelf is also due in part to a cabinet design that is acoustically efficient as well as handsome. Each is made of select walnut veneers and is meticulously hand sanded, oiled and waxed to a silky sheen. An acoustically transparent rich brown grille provides the perfect finishing touch.

The AMT 1b Bookshelf is, in every detail, the finest instrument ESS is capable of making in this convenient format. Keenly responsive, faithfully accurate, the 1b Bookshelf is the ultimate bookshelf system.

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SPECIFICATIONS

FULL SYSTEM

POWER CAPACITY	375 watts (clean music power)
NOMINAL IMPEDANCE	6 ohms minimum
DISPERSION	120° horizontal, 30° vertical
CROSSOVER FREQUENCY	1,000 Hz
SENSITIVITY	1 watt input produces 90 dB sound pressure at a distance of 1 meter
FREQUENCY RESPONSE	40-23,000 Hz ± 3 dB

CONTROLS

PRESENCE/BRILLIANCE	Continuously variable attenuation from + 3 dB to − ∞ from 1,200 Hz to beyond audibility

HEIL AIR-MOTION TRANSFORMER

TOTAL RADIATING AREA	21.5 sq. in. (139 cm^2) (equivalent to an 8" cone)
SQUARE WAVE RISE TIME	15 microseconds at 5,000 Hz
TRANSFORMATION RATIO	5.3:1 velocity increase
MAGNET ASSEMBLY WEIGHT	12 lbs. 15 oz. (5.87 kg)
FLUX DENSITY	4,500 Gauss

LOW FREQUENCY DRIVER

NOMINAL DIAMETER	12 in. (30.48 cm)
CONE MATERIALS	Bextrene
MAGNETIC ASSEMBLY WEIGHT	7 lbs. 6½ oz. (3.36 kg)
FLUX DENSITY	10,500 Gauss
VOICE COIL	2 in. (5.08 cm) Copper bonded with high temperature epoxy to an aluminum former
INSULATION	single polythermaleze

PASSIVE RADIATOR

NOMINAL DIAMETER	12 in. (30.48 cm)
DIAPHRAGM MATERIAL	.5 in. rigid EPS styrene foam base material laminated to a damping skin of .250" open cell foam. Unitary free air resonance: 5 Hz

DECOR

FINISH	oiled walnut
GRILLE COLOR	black-brown
DIMENSIONS	24 in. (60.96 cm) H 14 in. (35.56 cm) W 14 in. (35.56 cm) D
SHIPPING WEIGHT	65 lbs. (29.48 kg)

Specifications derived from anechoic chamber tests using B & K equipment at California State University, Sacramento.

Inside the ESS Heil air-motion transformer.

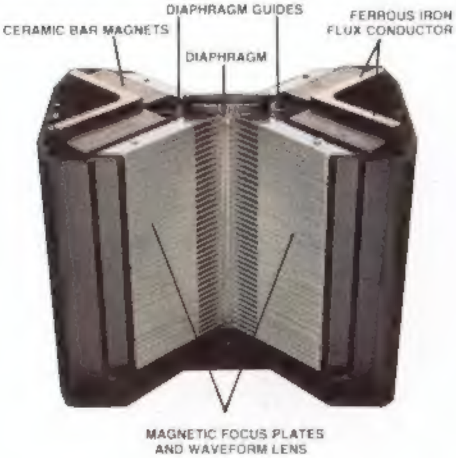
DIAPHRAGM GUIDES
CERAMIC BAR MAGNETS
FERROUS IRON FLUX CONDUCTOR
DIAPHRAGM
MAGNETIC FOCUS PLATES AND WAVEFORM LENS

Fig. 3

Figure 3:
The heart of the Heil air-motion transformer is a featherweight pleated Teflon diaphragm bonded with conductive aluminum strips. The diaphragm is suspended within a massive magnet structure. Its steel conductor plates concentrate an intense magnetic field around the diaphragm.

When a signal passes through the diaphragm's foil strips, the bellows-like motion of the pleats squeezes air out at five times the speed of the vibrating diaphragm itself. This virtual "instant acceleration"™ distinguishes the Heil from all other loudspeakers.

Figure 4:
Polar response curves at a wide range of frequencies reveal a broad horizontal dispersion pattern throughout the audible spectrum. The ability of the Heil air-motion transformer to disperse even the highest frequencies over a large area assures full stereo imaging anywhere in the listening environment.

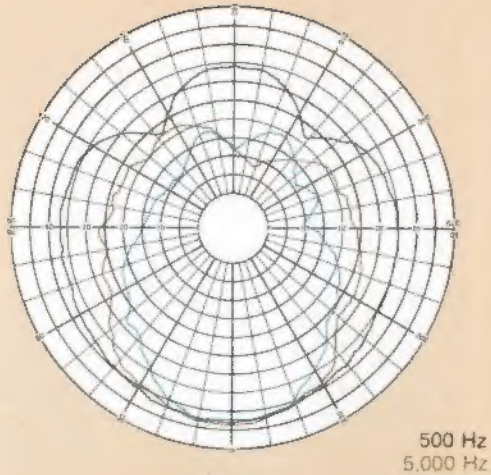

Fig. 4

Figure 5:
The superior response of the Heil air-motion transformer is revealed in its relatively flat impedance. The entire system's frequency response curve shows a typically broad, linear bandwidth. This exceptional efficiency at all frequencies permits the amplifier to deliver necessary power at ultrasonic frequencies.

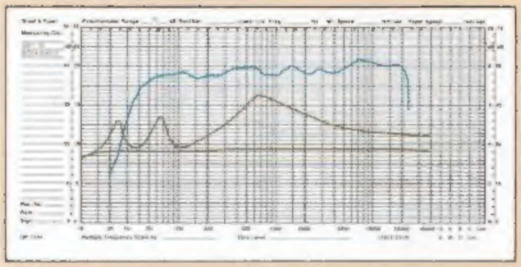

Fig. 5

Figure 6:
A pair of drawings illustrates the movements of the Heil's pleats and the corresponding musical sine wave signals. In Figure 6A, the front-facing pleats contract as the sine wave rises, forcing the air out under pressure. Meanwhile, the pleats opening towards the rear draw air in. When the sine wave reverses, as shown in figure 6B, the pleats contract in the opposite direction.

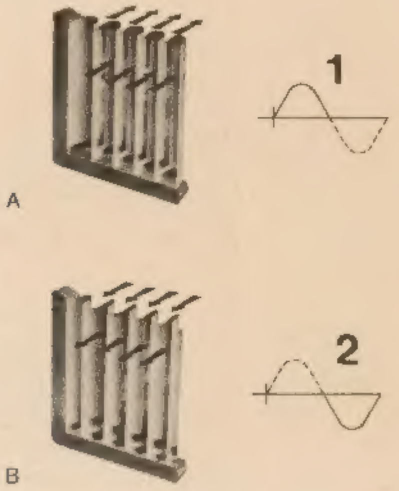

Fig. 6

Figure 7:
The "squeezing" action of the Heil diaphragm's pleats viewed in detail from above. As the pleat walls (A) squeeze together, they force a large amount of air to accelerate under pressure through a narrow opening (B). The folds are 5.3 times as deep as they are wide, resulting in a 430 percent increase in air velocity.

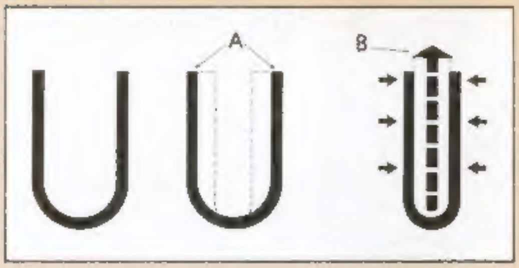

Fig. 7

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